

Who Thrives Where? A Bayesian Multilevel Analysis of Personality Traits and Individual Capability

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Abstract: The capability approach (CA), pioneered by Amartya Sen, has become one of the most influential normative frameworks for assessing human well-being and development. Rather than evaluating achieved outcomes such as self-reported life satisfaction alone, the CA emphasizes individuals' real freedoms, that is, their capability sets as opportunities to achieve valuable functionings. Despite its theoretical prominence, empirical operationalization of capabilities remains challenging because capabilities represent latent opportunity sets rather than directly observable achievements.

In previous work, we addressed this measurement challenge by developing a multidimensional Bayesian Item Response Theory (IRT) framework that operationalizes capabilities as latent traits derived from individuals' perceptions of their opportunity sets (paper under review). Instead of approximating capability through achieved functionings, we designed survey items that capture perceived access to education, freedom of speech, financial adequacy, health, community belonging, and environmental quality. Using a multidimensional graded response model, we demonstrated that personal, social, and environmental capabilities can be estimated as interrelated but distinct latent dimensions. The Bayesian framework allowed us to explicitly model item discrimination and difficulty parameters, incorporate covariates such as age and country, and quantify measurement uncertainty through posterior distributions and credible intervals. Our findings revealed substantial cross-country and age-related heterogeneity, as well as compensatory dynamics across dimensions: aggregate capability scores sometimes masked important weaknesses in specific domains.

Building on this validated measurement framework, the present study moves beyond the question of how to measure capabilities and asks why individuals differ in their perceived opportunity sets. Specifically, we investigate the relationship between personality traits as psychological conversion factors and examine the relationship between relative positioning within regional contexts and capabilities.

Theoretically, the CA emphasizes that resources are transformed into capabilities through conversion factors, which may be personal, social, or environmental. However, the role of stable psychological dispositions remains underexplored. Personality traits influence how individuals perceive opportunities, interpret constraints, mobilize agency, and engage with their social environment. Traits such as openness to experience, conscientiousness, extraversion, agreeableness, and emotional stability may systematically affect the perceived breadth of one's opportunity set, even under identical objective conditions.

However, we argue that capability is not driven solely by absolute levels of personality traits. Drawing on theories of social comparison, we conceptualize capabilities as socially embedded and context-dependent. Individuals do not evaluate their freedoms in isolation; rather, they interpret their room for action relative to the "typical" psychological profile within their local environment. In regional settings characterized by strong social cohesion and dense networks (such as rural areas) deviations from

prevailing personality constellations may either facilitate or constrain perceived agency. A highly open individual in a relatively traditional region may perceive expanded horizons, or conversely experience friction that limits effective opportunity use. Thus, we introduce regional reference groups as an additional explanatory layer in capability analysis.

Empirically, we draw on the RuWell dataset, a face-to-face survey of 2,400 rural residents in Albania, Kosovo, Moldova, and Romania. The data were collected using a proportional random sampling strategy across municipalities, villages, and households, ensuring representativeness for rural populations. Our previously estimated multidimensional Bayesian IRT model serves as the measurement backbone, producing dimension-specific latent capability estimates (personal, social, environmental) that incorporate full measurement uncertainty.

In a second step, we estimate Bayesian hierarchical regression models in which the extracted latent capability traits serve as outcome variables. Personality traits (Big Five dimensions) enter the model in two forms: (1) as individual-level absolute predictors and (2) as relative deviation scores from the regional mean personality profile at the county (rayon) level. This specification allows us to disentangle whether capabilities are primarily associated with intrinsic dispositions or with the distance between one's own personality and the prevailing regional constellation.

We find the strongest relationship between within-county deviation of personality traits (i.e. when an individual is different from the average of their county) and social capability, with all personality traits showing a relationship that is credibly different from zero. The relationship is positive for all personality traits except neuroticism, which is negative. We also find credibly important relationships in within-county deviation in the personality dimension for conscientiousness (weak positive correlation), neuroticism (negative relationship) and openness (positive); and in the environmental dimension for extraversion (positive), conscientiousness (negative for those below average) neuroticism (positive), and openness (positive). With respect to between-county variation (i.e. when counties are lower or higher), we find a positive relationship between neuroticism and social capability. That is all for between-county.

Methodologically, the Bayesian framework offers several advantages. First, it allows us to propagate measurement uncertainty from the IRT model into the regression stage, thereby avoiding the bias that arises when latent scores are treated as error-free. Second, the multilevel structure captures regional clustering and accommodates cross-level interactions between individual traits and contextual averages. Third, posterior predictive checks and credible intervals provide a transparent assessment of uncertainty, which is particularly relevant when interpreting regional heterogeneity.

We expect three main contributions. First, we extend the capability approach by explicitly incorporating personality traits as psychological conversion factors that shape how individuals translate resources into functionings. This adds a micro-level behavioral dimension to the CA's traditionally structural focus. Second, by introducing relative personality positioning within regional reference groups, we conceptualize capabilities as relational constructs that emerge at the intersection of individual disposition and spatial context. This contribution directly speaks to regional science by highlighting how place-specific social environments mediate the formation of perceived opportunity sets. Third, our analysis deepens the interpretation of multidimensional capability measurement by identifying mechanisms underlying cross-regional variation. Rather than attributing differences solely to institutional or infrastructural factors, we show how psychological composition and relative positioning within regions may amplify or attenuate capability perceptions.

For regional policy, the implications are substantial. If the findings suggest a relationship between capability levels and the personality–context alignment, then interventions aimed at expanding opportunity sets may need to consider not only material resource provision but also social climate, community norms, and diversity of dispositions within regions. Regions characterized by homogenous psychological profiles may systematically advantage some individuals while constraining others. Recognizing these relational dynamics can contribute to more nuanced place-based development strategies.

By integrating advanced latent measurement techniques with psychological and relational determinants, this study advances research on capability from measurement toward explanatory regional analysis. In doing so, it offers a theoretically grounded and methodologically rigorous framework for understanding how individual dispositions and spatial contexts may be related to the freedoms people perceive themselves to have reason to value.